of the radii of the convex, whence the radii themselves are easily deduced.

Mr. Barlow next inquires into the validity of the empirical rule employed by Mr. Tulley, as stated in Rees's Cyclopædia, which in many usual cases he finds to give results nearly agreeing with his own computations; in others, however, it differs too widely to be depended on.

The author next enters on an experimental inquiry of the limits within which an error in spherical aberration or dispersion may have taken place without producing a sensible defect in the object-glass, by procuring, with the assistance of Mr. Gilbert, glasses to be ground to radii nearly, but not quite agreeing with the results of computation. It results from them, that in some states of the data and assumed radii, much greater deviations may be borne than in others, and the author considers that such combinations should be preferred as admit the greatest latitude in this respect.

The author concludes this paper by a synoptic statement of a mode of approximate solution applicable (in consequence of the peculiarity of the formula for the destruction of the spherical aberration) to all ordinary states of the data, and comprised in a very short and easily calculable form; and by a method of practically determining the curvatures and indices of refraction of any given convex or concave lens.

On the Change in the Plumage of some Hen-Pheasants. *By* William Yarrell, *Esq. F.L.S.* *Communicated by* William Morgan, *Esq. F.R.S., March* 19, 1827. Read May 10, 1827. [*Phil. Trans.* 1827, *p.* 268.]

The last shooting season having been unusually productive of hen-pheasants, which have assumed more or less the plumage and appearance of the male, much discussion in consequence has arisen on the cause of this change; and the author having had many opportunities of examining the facts, both as respecting the pheasant and domestic fowl, was induced to notice the internal peculiarities which invariably accompany this transformation. According to an opinion of Mr. J. Hunter and of Mr. Butter, this change only takes place at an advanced age; but the author considers the facts in his possession as at variance with this idea, and that the appearances in question may occur at any period of life, and may even be produced artificially.

In all the instances examined by him, the sexual organs were found diseased, and to a greater or less extent in proportion to the change of plumage. The ovarium was shrunk, purple, and hard; the oviduct diseased, and the canal obliterated at the upper part, immediately preceding its funnel-shaped enlargement at the bottom of the ovarium. Having opened a hen-pheasant in its natural plumage, for the sake of comparison, he found a similar diseased state of the organs to exist; thus proving that the disease must exist some time before the corresponding change of feathers takes place.

He then observes, that it is no uncommon thing to find, among numerous broods of pheasants reared by hand, some females, which, at the age of only four months, produce the brightest plumage of the male; and in two instances of birds shot in a wild state, the nest feathers had not been shed, proving them to have been birds of the year.

A partridge, having a white bar across the breast, and the first three primary feathers in each wing white, being opened, exhibited the same sort of organic disease; and from circumstances adduced, it appears that this was also a bird of the year.

All variations in plumage, however, are not traceable to this cause. In most of the excepted instances, however, the individuals are dwarf birds, and the author attributes their variety of plumage to defective secretion,—the effect of weakness.

When the sexual organs are artificially obliterated in the common fowl;—in the male bird, so soon as this operation is performed, he ceases to crow; the comb and gills do not attain their full size; the spurs remain short and blunt; and the feathers of the neck assume an appearance intermediate between the hackled appearance of the cock, and the ordinary web of the hen. The operation on the female being performed (by obliterating the oviduct), the ova cease to enlarge; she makes an imperfect attempt to crow; the comb increases in size; and short and blunt spurs make their appearance. The plumage also alters both in colour and form, and approaches that of the cock; and the bones of the lower part of the back never acquire that enlargement requisite for giving a proper breadth to the pelvis. In short, the two sexes by this process approximate so nearly in character, that it is frequently difficult to determine the sex.

In the case of hen-pheasants, they assume the plumage of the male at best but imperfectly, and it is probable that they do not live many years after the change.

The author concludes by regarding it as a general law, that where the sexes of animals are indicated by external characters, these undergo a change, and assume a neutral appearance whenever original malformation, subsequent disease, or artificial obliteration, has deprived these organs of their true influence.

On the secondary Deflections produced in a Magnetized Needle by an Iron Shell, in consequence of an unequal Distribution of Magnetism in its two Branches. First noticed by Captain J. P. Wilson, *of the Honourable East India Company's Ship Hythe. By* Peter Barlow, *Esq. F.R.S. Mem. Imp. Sc. Petrop.* Read May 17, 1827. [*Phil. Trans.* 1827, *p.* 276.]

Captain Wilson being engaged in the prosecution of Mr. Barlow's inquiries as to the laws of the deflection of a needle by an iron shell, had remarked, while in China, that when a magnetic needle was placed in the equator of an iron shell, though no deviation arose when the compass was in its natural state, yet when one end of the